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(54) Abstract Title: **Record deck interface for the manipulation of digital audio files**

(57) An audio control device 101, for use with a record deck 200, comprises an engaging means (104, figure 2) rotationally coupled to a rotatable surface 202 of the record deck 200, sensing means for detecting the rotational speed and direction of the engaging means (104, figure 2) and support means 102 to support the engaging means (104, figure 2) in a fixed relation with a non-rotating surface of the record deck 200. The engaging means (104, figure 2) may be connected to the spindle (203, figure 2) of the record deck or alternatively may be adapted for connection to an adapter (105, figure 3), the adapter (105, figure 3) having a collar (105a, figure 3) for connecting to the engaging means (104, figure 3) and a flange (105b, figure 3) for coupling to a rotating surface 202 of the record deck 200. The adapter (105, figure 3) and engaging means (104, figure 2) may be integrated, with the flange (105b, figure 3) at least partially covering the record deck platter 202 to form a frictional coupling adapted to allow at least partial slipping. The sensing means may be optical and include an encoder wheel. The control device may feature a digital signal generator for the communication of digital signals to a computer 300, the device 101 facilitating the scratching or mixing of digital audio files by a DJ.

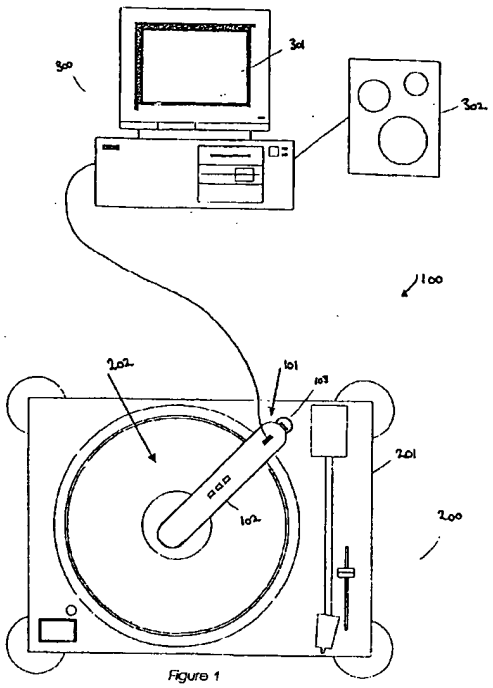

Figure 1

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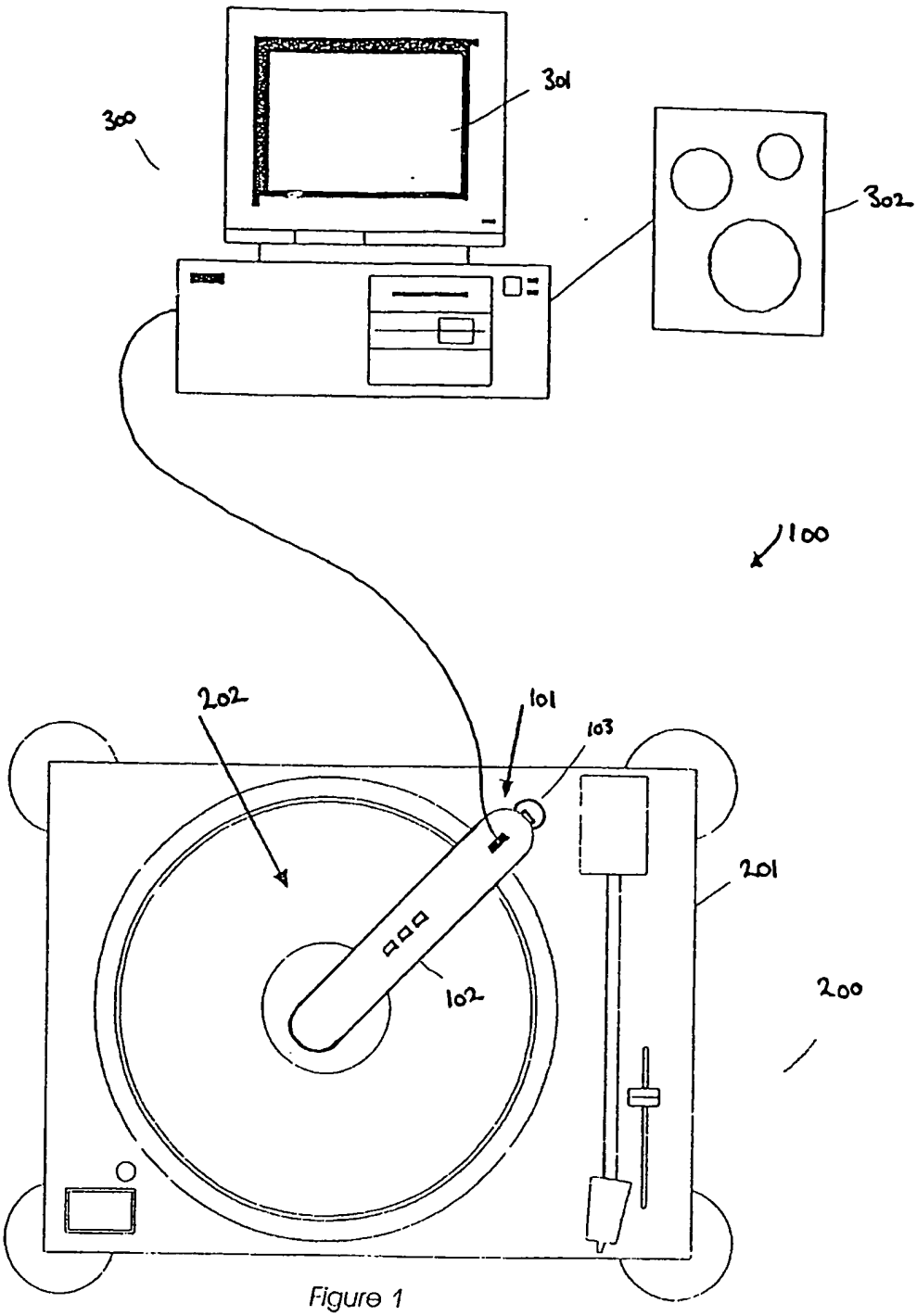

Figure 1

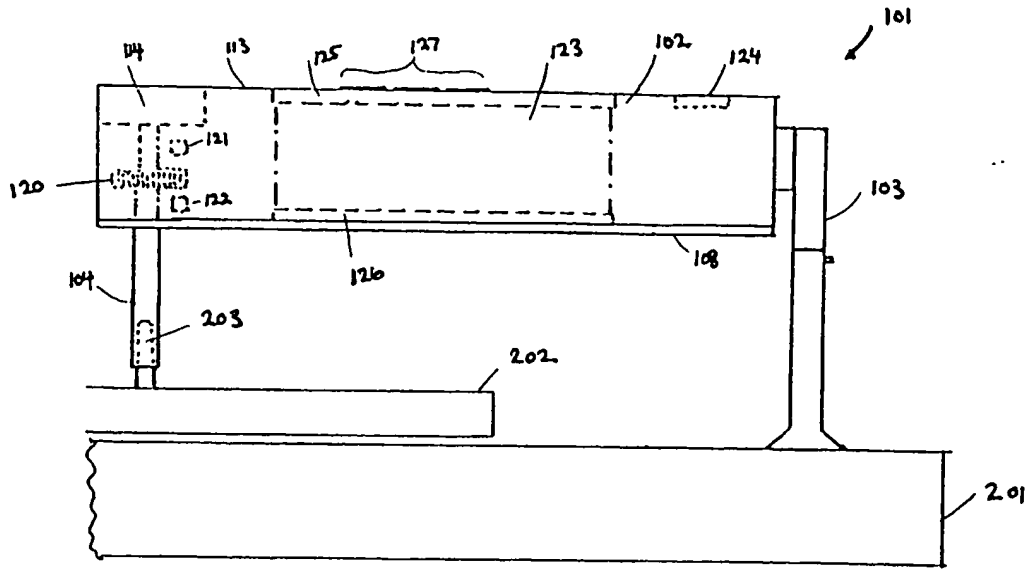

Figure 2

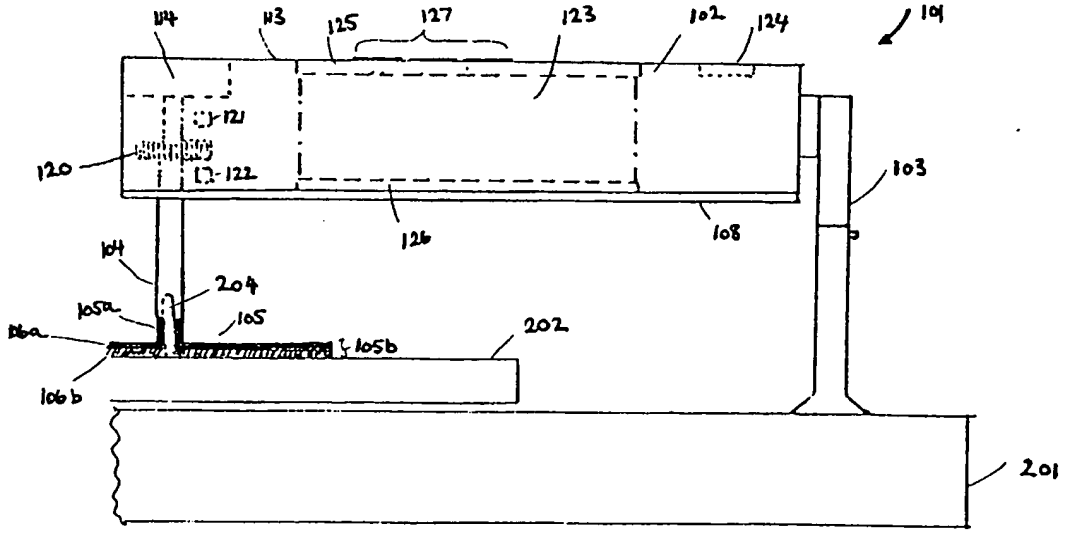

Figure 3

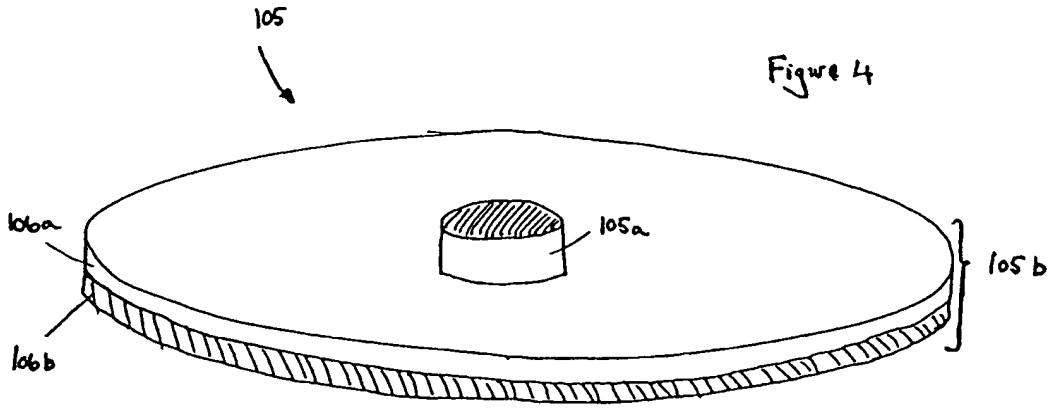

Figure 4

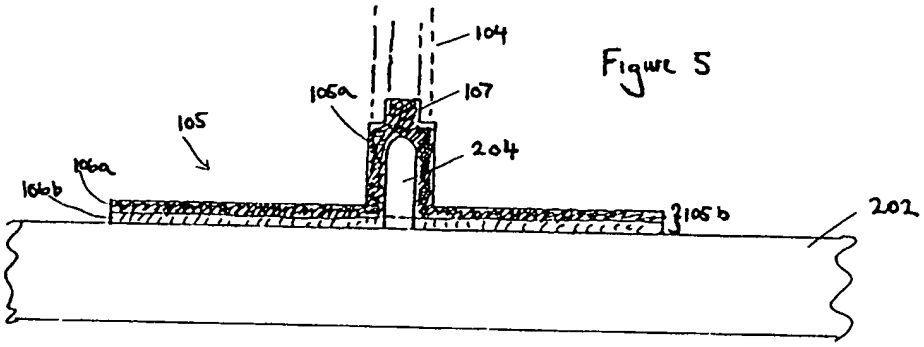

Figure 5

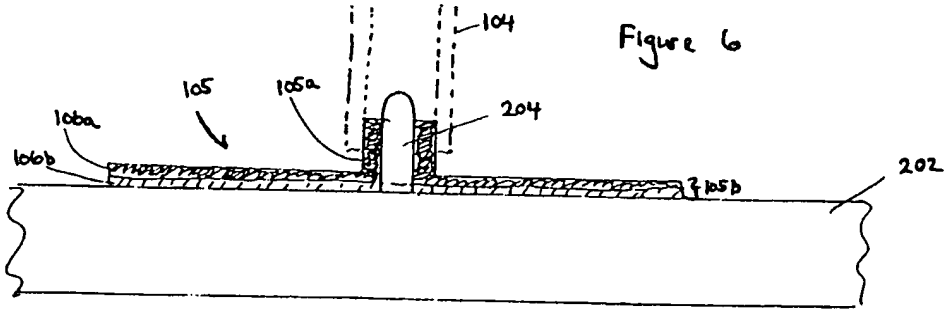

Figure 6

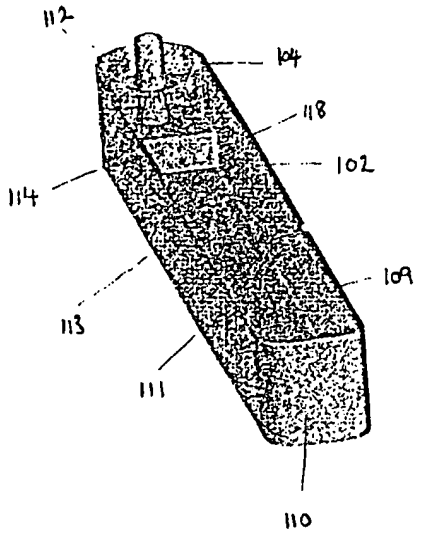

Figure 7

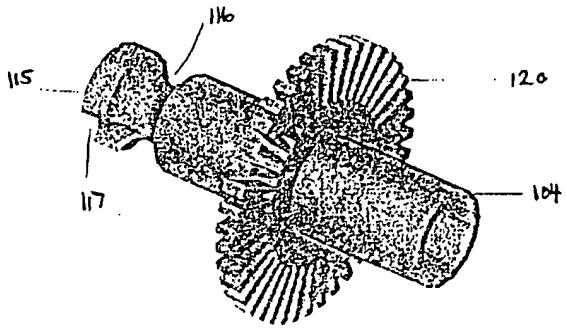

Figure 8

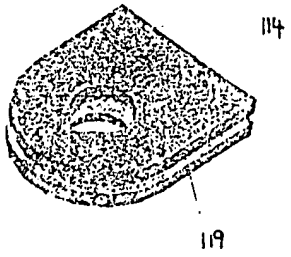

Figure 9

RECORD DECK INTERFACE

The present invention relates to record deck interfacing and digital audio mixing.

Audio mixing is a common technique within the modern music industry and is a well known feature of club and discothèque music. In recent years, audio mixing has increasingly become a popular leisure pursuit for both amateur Disc Jockeys (DJs) and music enthusiasts.

Traditional techniques of audio mixing involve the use of record decks, whereby two or more vinyl records are played concurrently, to allow the DJ to 'cue' one track whilst the other is playing. Cueing of tracks enables the DJ to fade or cut between tracks at an appropriate moment to match the tempo and beat of the individual tracks.

DJs are able to create a multitude of interesting audio effects by manipulating the speed and direction of rotation of the vinyl records. Such a process is described as 'scratching' and involves moving either the vinyl record or the platter of the record deck by hand.

A major drawback to traditional forms of audio mixing is the cost of the equipment, since the enthusiast will require at least two record decks or a twin platter record deck, and a mixer. In addition, the record deck will require a tone arm having a stylus adapted for scratching, since conventional styli are likely to break and may cause damage to the surface of the vinyl record.

An alternative to vinyl records is the use of compact discs (CDs), however CD audio mixing systems incorporating two CD players and a mixer are prohibitively expensive for the enthusiast, particularly if the functionality to scratch the CDs is desired.

Vinyl and CD based audio mixing systems also suffer from the further disadvantage of storage and transportation of the music media. A DJ will typically have a large collection of vinyl records and/or CDs, requiring some form of storage case, which will need to be transported safely with the DJ to the music venues. The cost of compiling a large music collection, coupled with the inconvenience of transporting the media, can deter many enthusiasts from experimenting with audio mixing as either a profession or as a hobby.

One solution to the problems identified above has been to use a personal computer (PC) instead of a record deck, to both store and play music, the music being stored in a digital format such as MP3, WAV and AIF. Music may be readily transferred to the storage media of the PC, such as the hard drive, and can be readily transported with the PC to the desired music venue, particularly if the PC is a laptop or if the storage media is removable. A DJ may typically store thousands of music tracks suitable for mixing, which may then be played through the sound card of the PC.

Most sound cards allow the simultaneous reproduction of two audio tracks and software packages such as Traktor (www.nativeinstruments.com) PCDJ (www.pcdj.com) and AtomixMP3 (www.atomixmp3.com), allow the DJ to mix tracks to emulate the action of a record deck and mixer.

However, PC based audio mixing systems provide only a 'virtual' DJ experience, since the user interacts with a graphical interface via the

computer monitor, supplying instructions to the software by selecting on-screen icons using mouse clicks. Such a system is unable to provide the feel and experience of a real record deck and cannot replicate the sensation of scratching a vinyl record or CD. DJs and enthusiasts alike agree that much of the enjoyment of audio mixing is obtained from the tactile contact and physical manipulation of the music media.

There are many examples of audio mixing systems that attempt to bridge the gap between the traditional mixing systems and the digital mixing systems, one of which is the FinalScratch™ mixing system (www.finalscratch.com). This allows mixing of digital audio tracks on a PC using a standard record deck as the controller, the tracks being stored on the PC storage device. Audio mixing effects are created by using special time coded vinyl records, the records including crossover spacers cut into the grooves at regular time intervals. The playback is controlled by the FinalScratch™ software, which provides a graphical interface for the DJ. A potential disadvantage of this system is the cost of the equipment, requiring the enthusiast to invest in a twin platter record deck or two record decks, and the coded vinyl records and software.

Another audio mixing system is the XP10 Digital DJ Player developed by the Finnish based company EKS (http://eks.fi). The XP10 replaces the record deck completely and instead provides a controller having a touch sensitive disc, the controller being interfaced to a PC. Audio effects are created by rotating the disc back and forth by hand and by varying the rotation speed of the disc, to mix digital tracks stored on the PC. The controller does not support the use of vinyl records or CDs and therefore does not provide the authentic feel of a record deck.

A further audio mixing system is the PCDJ DAC-2 Controller (www.pcdj.com) which is a controller for mixing digital tracks stored on a PC. The controller has two rotatable dials which allow audio effects to be created by rotating the dials back and forth by hand and by varying the rotation speeds of the respective dials. The controller does not support the use of vinyl records or CDs and cannot provide the authentic feel of manipulating a record deck and music media.

It is an object of the present invention to provide a low cost digital mixing solution that preserves the tactile experience and dextrous skills of DJs and music enthusiasts, so that the advantages of digitally stored music may be fully embraced without sacrificing the use of standard record decks.

It is a further object of the present invention to provide such a solution which works with a wide range of proprietary audio mixing software packages.

It is a further object of the present invention to provide a mechanism that will convert a record deck or gramophone into a digital audio mixing system, when used in conjunction with a PC running a proprietary audio mixing software package.

According to a first aspect of the present invention there is provided an audio control device for use with a record deck, comprising:

engaging means for engaging a rotatable surface of the record deck, the engaging means being operatively coupled for rotation thereon;

sensing means to detect the rotational speed and direction of the engaging means; and

support means to support the engaging means, in a fixed relation with a non-rotating surface of the record deck.

Embodiments of the present invention will now be described by way of example and with reference to the accompanying drawings in which:

Figure 1 shows a schematic representation of an audio control device attached to a record deck and interfaced to a personal computer.

Figure 2 shows a side plan view of the audio control device of figure 1.

Figure 3 shows a side plan view of an alternative arrangement of an audio control device.

Figure 4 shows a side elevation view of an adapter for a record deck.

Figure 5 shows a side cross-sectional view of an alternative arrangement of an adapter for a record deck.

Figure 6 shows a side cross-sectional view of another alternative arrangement of an adapter for a record deck.

Figure 7 shows a top elevation view of a support means of the audio control device of figures 2 and 3.

Figure 8 shows a side elevation view of an encoder wheel and an engaging means for an audio control device of the present invention.

Figure 9 shows a top elevation view of a bearing housing for an audio control device of the present invention.

With reference to figure 1 there is shown a digital audio mixing system 100, comprising a record deck 200 and a personal computer (PC) 300. The record deck includes a plinth 201 and a rotatable platter 202, the platter 202 driven in a conventional manner by a drive mechanism (not shown) within the plinth 201 of the record deck 200. The record deck 200 further includes a spindle (shown in figures 2 and 3) disposed at the centre of the platter 201 which may either rotate as the platter 202 rotates or is fixed so as to not rotate with the platter 202. It is to be appreciated that record decks 200

generally fall into one of two categories, those with rotating spindles and those with non-rotating spindles.

The PC 300 represents any personal computer having a display device 301 such as a visual display unit (VDU) and a storage medium (not shown), which includes but is not limited to, a hard disk drive. The PC must also include an operating system capable of running any one of the proprietary audio mixing software packages as discussed previously and as described in the art.

Audio tracks are stored on the storage medium in any of the standard digital formats, which includes but is not limited to MP3, WAV and AIF. Playback of the audio tracks is through a conventional sound card (not shown) installed within the PC. It is to be understood that any reference herein to 'sound card' is also taken to include an audio chipset which can convert a digital audio signal into an analogue audio signal which is then amplified in order to drive an output device 302, such as speakers or headphones.

Referring again to figure 1, there is shown an audio control device 101 according to a preferred embodiment of the present invention. The audio control device comprises a support means 102 having a proximal end fixed to the plinth 201 of the record deck 200. The plinth 201 forms a non-rotating surface in relation to the platter 202. The proximal end of the support means 102 is preferably fixed to the plinth 201 by an attachment means 103 which connects to the proximal end of the support means 102 and to a surface of the plinth 201.

In figure 2, there is shown a side plan view of the audio control device 101 according to a preferred embodiment of the present invention. In this arrangement an engaging means 104 engages with a spindle 203 (shown

partially in dashed outline) of the record deck 200. The spindle 203 is of the type that rotates with the platter 202. The surface of the spindle 203 forms a rotatable surface to which the engaging means 104 connects.

It is to be appreciated that the engaging means 104 may be connected to the spindle 203 using any suitable means which operatively couple the engaging means 104 to the surface of the spindle 203, so that the engaging means 104 rotates with rotation of the spindle 203. The spindle 203 is rotated by rotation of the platter 202, which may be performed by hand or by the drive mechanism.

Preferably the engaging means 104 is disposed proximate to the distal end of the support means 102.

In a preferred arrangement the engaging means 104 is a cylindrical sleeve having an internal diameter of sufficient dimension to allow the sleeve to snugly slide over the spindle 203 to frictionally grip the surface of the spindle 203.

In another preferred arrangement the engaging means 104 is a cylindrical sleeve having an internal diameter of sufficient dimension to allow the sleeve to slide over the spindle 203 without there being any contact between the inside surface of the sleeve and the surface of the spindle 203. The sleeve is connected to the spindle 203 by a grub screw passing through the wall of the sleeve to engage the surface of the spindle 203.

It is to be appreciated in any of the preferred arrangements, that the cross-section of the sleeve is not limited to being circular and may take the form of any suitable geometrical shape e.g. square, triangular and hexagonal.

In figure 3 there is shown a side plan view of the audio control device 101 according to another preferred embodiment of the present invention. In this arrangement the engaging means 104 connects to an adapter 105 shown in figure 4, the adapter comprising a collar 105a and a flange 105b. The flange 105b is preferably dimensioned so as to at least partially cover the surface of the platter 202. The adapter 105 is preferably used with record decks 200 having non-rotating spindles 204, in order to communicate the rotation of the platter 202 to the engaging means 104.

The lower surface 106b of the adapter flange 105b preferably engages with the upper surface of the platter 202. The upper surface of the platter 202 forms a rotating surface when the platter 202 rotates. In preferred arrangements, the lower surface 106b of the adapter flange 105b is rotationally coupled to the upper surface of the platter 202 by friction between the two surfaces. The weight of the adapter may be selected so as to modify the degree of friction required.

The adapter is preferably connected to the engaging means through a collar 105a. The collar 105a forms part of the upper surface 106a of the adapter 105. In preferred arrangements the collar 105a of the adapter 105 partially or fully encloses the non-rotating spindle 204 of the record deck 200, the collar 105a either snugly engaging the spindle 204 or loosely engaging the spindle 204.

In figures 5 and 6 there are shown cross-sectional views of preferred arrangements for the collar 105a of the adapter 105. In figure 5 the collar preferably comprises a sheath, fully enclosing the non-rotating spindle 204. The sheath includes a neck portion 107 of smaller diameter than the collar 105a, allowing the engaging means 104 to connect to the collar 105a. In such an arrangement the non-rotating spindle 204 does not enter inside of

the engaging means 104. In figure 6 the collar 105a preferably encloses only part of the non-rotating spindle 204, the engaging means 104 preferably connecting to the outer surface of the collar 105a. In such an arrangement the non-rotating spindle 204 does at least partially enter inside the engaging means 104.

It is to be understood that any suitable means for connecting the adapter 105 to the engaging means 104 may be used, including but not limited to, a clip, a screw and adhesives. Alternatively, the adapter may be 'push fit' into the engaging means, to be held together by surface friction. In all preferred arrangements rotation of the adapter 105, either directly by hand or due to rotation of the platter, causes rotation of the engaging means 104.

In another preferred arrangement the adapter 105 is integrated with the engaging means 104 to form a single component.

In the preferred arrangement the upper surface 106a and the lower surface 106b of the adapter flange 105b are made from the same material, which is preferably rigid plastic. The lower surface 106b of the adapter flange 105b may either be smooth or textured depending on the required degree of frictional coupling between the adapter 105 and the upper surface of the platter 202.

In other preferred arrangements the lower surface 106b of the adapter flange 105b may be made from a different material to the upper surface 106a, and is preferably rubber, which may either be smooth or textured depending on the required degree of frictional coupling between the adapter 105 and the upper surface of the platter 202.

In preferred arrangements the lower surface 106b of the adapter flange 105 may at least partially slip with respect to the upper surface of the platter 202. Slippage of the adapter 105 allows the adapter 105 to be partially de-coupled from the rotation of the upper surface of the platter 202 and allows the adapter 105 to be manipulated by hand as desired, without necessarily rotating the platter 202.

Preferably the upper surface 106a of the adapter flange 105 is moulded to resemble a vinyl record and may include a central label for aesthetic appeal.

Referring again to figures 2 and 3, any suitable means may be used to fix the attachment means 103 to the surface of the plinth 201. These include, but are not limited to, a clamp, a clip, a suction cup and an adhesive pad.

Preferably the attachment means 103 include a height adjustment means, to allow the height between the support means 102 and the plinth 201 to be adjusted. Adjusting the height allows the engaging means 104 to be lowered or raised to an appropriate level in order to engage the spindle 203 or the collar 105a of the adapter 105. The height adjustment means may be any suitable means capable of adjusting the height of the support means 102 and includes, but is not limited to, a telescoping rod (as shown in figures 2 & 3), a worm screw and a ratchet bar.

In preferred arrangements the attachment means 103 may be permanently connected to the support means 102 by any suitable form of connection means, including but not limited to, a screw, a rivet and an adhesive.

In other preferred arrangements the attachment means 103 may be removably connected to the support means 102 by any suitable form of

connection means, including but not limited to, a catch, a clip and a suction cup.

Alternatively, in yet further preferred arrangements the attachment means 103 may include a threaded portion (not shown) which may then be screwed into a reciprocate threaded channel (not shown) in the support means 102 or vice versa.

In the preferred arrangements the connection between the support means 102 and the attachment means 103 may allow a degree of lateral and/or vertical motion to adjust the pan and/or tilt of the support means relative to the horizontal and vertical axes of the attachment means 103. This allows an improved alignment between the engaging means 104 and the spindle 203 or the adapter 105.

Referring once more to figures 2 and 3, the support means 102 is preferably made from a material such as rigid plastic, but may also be made from any material of sufficient rigidity so as to not deform under the weight of itself or that of the weight of the engaging means 104.

In the preferred arrangement as shown in figure 7, the support means 102 takes the form of a rigid elongate housing, having four side walls 109-112, a top face 113 and a removable base cover 108 (shown in figures 2 & 3). The base cover 108 includes an aperture (not shown) to allow the engaging means 104 to protrude through the base cover 108. Preferably, the end side walls 110 and 112 are arcuate in form. It is to be appreciated that the housing need not be limited to an elongate form and may instead assume any suitable shape compatible with operation of the device.

In preferred arrangements the elongate housing includes a bearing housing 114 (shown in figures 2, 3, & 7) which receives an end portion 115 (shown in figure 8) of the engaging means 104, the end portion 115 being journaled for rotation within the bearing housing 114. The end portion 115 of the engaging means 104 preferably includes a circumferential bearing channel 116, into which ball bearings (not shown) are inserted when the engaging means 104 are disposed in the bearing housing 114. The ball bearings are preferably inserted into the bearing channel 116 through an access notch 117 in the end portion of the engaging means 104.

In a preferred arrangement the bearing housing 114 is fixed into the elongate housing by a protruding ridge 118 on the inside surface of the elongate housing. The ridge 118 preferably runs at least partially along opposing side walls 109 and 111 at the distal end of the support means 102, and around the inside of the preferably arcuate surface of the end wall 112. The ridge 118 engages with a corresponding channel 119 (shown in figure 9) preferably running at least partially around the perimeter of the bearing housing 114, thereby causing the ridge 118 and the channel 119 to interlock, fixing the bearing housing 114 in place.

It is to be appreciated that any suitable bearing means may be used to support the end portion 115 of the engaging means 104 to allow the engaging means to freely rotate around the longitudinal axis of the engaging means 104. Also, any suitable means of fixing the bearing housing 114 into the elongate housing may be used, including but not limited to, a screw, a clip, and an adhesive.

In preferred arrangements the rotational speed and direction of the engaging means 104 are detected by sensing means which are preferably optical. In figures 2 and 3 there is shown a preferred arrangement in which the sensing

means include an encoder wheel 120 and a pair of optical transducers 121, 122. In the preferred arrangement the encoder wheel 120 is integrated with the engaging means 104, as shown in figures 2, 3 and 8, and rotates with rotation of the engaging means 104. Alternatively, the encoder wheel 120 may be a separate element adapted to receive the engaging means 104 through a central aperture, the encoder wheel 120 then being fixed to the engaging means 104 using any suitable means.

In another preferred arrangement the encoder wheel 120 may be located adjacent to the engaging means 104 and be rotationally coupled to the engaging means 104 by a drive belt assembly. In a further preferred arrangement the encoder wheel 120 may be located adjacent to the engaging means 104 and be rotationally coupled to the engaging means 104 by a cogwheel assembly. It should to be appreciated that any suitable means may be used which rotationally couples the encoder wheel 120 with the engaging means 104, such that rotation of the engaging means 104 causes the encoder wheel 120 to rotate.

The optical transducers 121, 122, may be conventional types and preferably operate in the infra-red region of the electromagnetic (EM) spectrum. One of the transducers 121 is an emitter while the other 122 is a detector. In use the emitter 121 preferably continuously emits light along a light path joining the two transducers. It is to be understood that any reference herein to 'light' is taken to include infra-red, as well as other spectral regions of the EM spectrum.

In preferred arrangements the optical transducers 121, 122 are disposed in a conventional manner to the encoder wheel 120, such that rotation of the encoder wheel 120 intermittently interrupts light communicated along the light path by the emitter 121 to the detector 122. The rate of cutting of the

light along the light path provides an indication of the speed of the engaging means 104.

In a preferred arrangement the sensing means includes a conventional encoder device which may be a coded mask forming part of the encoder wheel 120, or attached to the encoder wheel 120 or to the engaging means 104. The encoder device interrupts the light communicated by the emitter 121 in a predetermined pattern which allows the direction of the encoder wheel 120, and in turn, the engaging means 104 to be detected.

In another preferred arrangement the sensing means includes an adjacent pair of optical transducers each receiving light communicated along a respective light path from an opposing pair of emitters. The direction of rotation of the encoder wheel 120 is determined by detecting which one of the detectors first senses an interruption of light relative to the other.

It is to be appreciated that any suitable means may be used to sense the rotational speed and direction of the engaging means 104, including, but not limited, to any optical, electrical and mechanical devices.

Referring again to figures 2 and 3 there is shown (in dashed outline) in a preferred arrangement, a digital signal generator 123. The digital signal generator 123 is a conventional type and is preferably enclosed within the elongate housing, along with the sensing means with which the digital signal generator 123 is preferably in electrical communication. In preferred arrangements the sensing means communicates an electrical signal to the digital signal generator 123, which then generates digital signals related to the rotational speed and/or direction of the engaging means 104. The digital signal generator 123 preferably includes an interface 124 which is capable

of communicating the digital signals to the PC 300 for processing by a suitable audio mixing software package (as described previously).

In preferred arrangements the interface 124 is a Universal Serial Bus (USB) standard interface which connects to a USB port (not shown) on the PC 300. It is to be appreciated that any suitable standard interface may be used to connect the audio control device 101 to the PC 300, including but not limited to, a serial port, a parallel port, a RS232 port, IrDa port and a SCSI port. Alternatively, the audio control device 101 may communicate the digital signal to the PC 300 using an ad-hoc wireless communications protocol such as Bluetooth or ZigBee.

In preferred arrangements the digital signal generator 123 is fixed into the elongate housing by two fixing channels 125, 126 as shown in figures 2 and 3. One fixing channel 125 is preferably on the inside surface of the top face 113 of the elongate housing and the other fixing channel 126 is on the inside surface of the base cover 108. Preferably the channels 125, 126 run at least partially along the lengths of the respective surfaces 108, 113 and are preferably in opposing relation. The outer surfaces of the digital signal generator 123, engage with the respective fixing channel to fix the signal generator means into the elongate housing when the base cover 108 is placed into position on the bottom of the elongate housing.

It should be understood that any suitable means of fixing the digital signal generator 123 into the elongate housing may be used, including but not limited to, a screw, a clip and an adhesive.

In other preferred arrangements the digital signal generator 123 may be located outside of the elongate housing, while still being supported by the support means 102. In further preferred arrangements the digital signal

generator 123 may be remote to the support means 102, communicating with the sensing means using any suitable communication means.

In preferred arrangements the support means 102 includes one or more switches 127 mounted on a surface of the support means 102. The switches 127 are of conventional type and are preferably in electrical communication with the digital signal generator 123. The switches 127 preferably control a mode of operation of the digital signal generator 123 to modify the digital signals communicated by the interface 124. Preferably one of the switches 127 is an on/off switch which activates or deactivates the audio control device 101, notifying the audio mixing software that control of the audio playback is to be passed to the audio control device 101 or passed back to the software, respectively. When control is passed to the audio control device 101, manipulation of the platter and/or adaptor by hand generates digital signals to control the audio mixing software. In preferred arrangements the switches 127 are mounted on the top cover 113 of the elongate housing.

In the preferred arrangements another one of the switches is used to operatively select which music track or song is to be played and may also be used to toggle between various options displayed by the audio mixing software graphical interface.

In preferred arrangements the adapter flange 105b comprises a touch sensitive switch adapted to control a mode of operation of the digital signal generator 123 to preferably modify the digital signals communicated by the interface 124. Preferably the touch sensitive switch is electrically connected in parallel with the on/off switch and can be any suitable means of detecting human touch of the adapter flange 105b, and includes but is not limited to, an electrostatic plate and a thin pressure membrane. Preferably the touch

sensitive switch is in electrical communication with the digital signal generator 123. The touch sensitive switch preferably forms part of the upper surface 106a of the adapter flange 105b, but could equally well form part of the lower surface 106b of the adapter flange 105b. Preferably the touch sensitive switch performs the function of an on/off switch, activating or deactivating the audio control device 101, to notify the audio mixing software that control of the audio playback is to be passed to the audio control device 101 or passed back to the software, respectively.

In other preferred arrangements the touch sensitive switch can detect human touch of the surface of the platter 202.

In another embodiment of the present invention, the engaging means is preferably a contact wheel adapted for rotational coupling to the surface of the rotatable platter 202. The contact wheel is supported by a support means which are preferably fixed to a surface of the plinth 201. In preferred arrangements the contact wheel engages with the upper surface of the platter 202 and rotates with rotation of the platter 202. The contact wheel may engage with the upper surface of the platter 202 at any radial distance from the centre of the platter 202, although in preferred arrangements the contact wheel is disposed towards the outer edge of the platter 202 so that a proportionately larger angular motion is detected for any rotation of the platter 202.

In alternative arrangements the contact wheel may engage the side edge of the platter 202. The contact wheel is suitable for use with either of the two categories of record deck 202, i.e. those with rotating spindles 203 and those with non-rotating spindles 204.

It is to be appreciated that the features of the previous preferred arrangements are also adaptable for use with arrangements involving the contact wheel and are therefore not duplicated for conciseness.

Although the described embodiment is ideal for bridging the gap between traditional mixing and digital mixing, it will be recognised that the principle can be extended to other types of control devices requiring a degree of hand manipulation.

Other embodiments are intentionally within the scope of the appended claims.

CLAIMS

1. An audio control device for use with a record deck, comprising:

engaging means for engaging a rotatable surface of the record deck, the engaging means being operatively coupled for rotation thereon;

sensing means to detect the rotational speed and direction of the engaging means; and

support means to support the engaging means, in a fixed relation with a non-rotating surface of the record deck.

2. The device of claim 1, wherein the engaging means is adapted for connection to a spindle of the record deck platter.

3. The device of claim 1, wherein the engaging means is adapted for connection to an adapter, the adapter having a collar for connecting to the engaging means and a flange for coupling to a surface of the record deck platter, the collar adapted to at least partially enclose a spindle of the record deck platter.

4. The device of claim 3, wherein the adapter is integrated with the engaging means.

5. The device of claim 3 or claim 4, wherein the adapter flange is adapted to at least partially cover the surface of the platter.

6. The device of any of the claims 3 to 5, wherein the adapter flange includes an upper surface and a lower surface, the lower surface adapted for frictional coupling to the surface of the record deck platter.

7. The device of claim 6, wherein the lower surface of the adapter flange is adapted to allow at least partial slipping in relation to the surface of the record deck platter.

8. The device of claim 1, wherein the engaging means comprises a contact wheel adapted for rotational coupling to the rotatable surface of the record deck.

9. The device of claim 8, wherein the contact wheel is adapted to be in contact with either an upper surface of the platter or an edge surface of the platter.

10. The device of any of the preceding claims, wherein the sensing means is optical.

11. The device of claim 10, wherein the sensing means includes an encoder wheel for optically detecting the rotational speed of the engaging means.

12. The device of claim 11, wherein the sensing means further includes an encoder device for optically detecting the direction of rotation of the engaging means.

13. The device of any of the preceding claims, further comprising a digital signal generator in communication with the sensing means, to generate digital signals related to the rotational speed and/or direction of the engaging means.

14. The device of claim 13, wherein the digital signal generator includes an interface for communicating the digital signals to a personal computer.

15. The device of claim 14, wherein the interface is a USB standard interface suitable for connection to a USB port on the personal computer.

16. The device of any of the preceding claims, wherein the support means is adapted to support the sensing means.

17. The device of claim 13, wherein the support means is adapted to support the digital signal generator.

18. The device of any of the preceding claims, wherein the support means further comprises attachment means adapted for attaching the support means to a record deck plinth, the record deck plinth forming the non-rotating surface.

19. The device of claim 18, wherein the attachment means includes height adjustment means for adjusting the height between the support means and the record deck plinth.

20. The device of claim 14, wherein the support means further comprises one or more switches mounted on a surface of the support means, the one or more switches adapted to operatively control a mode of operation of the digital signal generator to modify the digital signals communicated by the interface.

21. The device of claim 3, wherein an upper surface of the adapter flange comprises a touch sensitive switch adapted to operatively control a mode of operation of a digital signal generator to modify a digital signal output.

22. The device of claim 18, wherein the support means comprises a rigid elongate housing having a proximal end adapted for connection to the attachment means and a distal end adapted to support the engaging means.

23. The device of claim 22, wherein the housing includes a removable base cover, the base cover including an aperture to allow the engaging means to protrude through the base cover.

24. The device of claim 22 or claim 23, wherein the housing is adapted to house the sensing means.

25. The device substantially as described herein with reference to the accompanying drawings.

Application No: GB 0320617.4 **Examiner:** Rupert Knights
Claims searched: 1 **Date of search:** 17 February 2004

Patents Act 1977 : Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance	
X	1,3-7,10, 13,14 & 16	WO 1997/001168 A1	RICKLI (figs. 1A-C & 2A-D, note engaging means 16, sensing means 11 and support means 10)
A		GB 2361348 A	FORD (figs. 1 & 2, see also paragraphs 1-3, page 1)
A		DE 29703145 U1	IDE (figs. 1-4, see also WPI abstract accession no. 1997-237746/22)

Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC[W]:

F2Y, G5J, G5R

Worldwide search of patent documents classified in the following areas of the IPC[7]:

G10H, G11B

The following online and other databases have been used in the preparation of this search report:

EPODOC, JAPIO, WPI